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Claims

1. A process for producing alkali metal chlorate in an electrolytic cell, said cell being divided by a cation selective separator into an anode compartment in which an anode is arranged and a cathode compartment in which a gas diffusion electrode is arranged, said process comprising introducing an electrolyte solution containing alkali metal chloride into the anode compartment and an oxygen-containing gas into the cathode compartment; electrolysing the electrolyte solution to produce an electrolysed solution in the anode compartment, electrolysing oxygen introduced into the cathode compartment resulting in the formation of alkali metal hydroxide in the cathode compartment; transferring the electrolysed solution from the anode compartment to a chlorate reactor to react the electrolysed solution further to produce a concentrated alkali metal chlorate electrolyte.
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2. A process according to claim 1, wherein said gas diffusion electrode divides the cathode compartment into a gas chamber on one side of the gas diffusion electrode and an alkali metal hydroxide chamber on the other side thereof confined between the gas diffusion electrode and the cation selective separator, introducing an alkali metal hydroxide solution into the alkali metal hydroxide chamber and the oxygen-containing gas into the gas chamber.
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3. A process according to claim 1, wherein the cation selective separator is a cation selective membrane.
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4. A process as claimed in claim 1, wherein the electrolyte solution has a pH from about 5.5 to about 8.
5. A process as claimed in claim 1, wherein the electrolyte solution has an alkali metal chloride concentration from about 50 to about 250 g/l.
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6. A process as claimed in claim 1, wherein the electrolyte solution introduced into the anode compartment has an alkali metal chlorate concentration from about 300 to about 650 g/l.
7. A process as claimed in claim 1, wherein the electrolyte solution has an alkali metal chlorate concentration from about 1 to about 50 g/l.
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8. A process as claimed in claim 1, wherein the electrolyte solution has an alkali metal chromate concentration is from about 0.01 to about 10 g/l.
9. A process as claimed in claim 1, wherein the electrolyte solution contains no alkali metal chromate.
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10. A process as claimed in claim 1, wherein the cathode compartment has an alkali metal hydroxide concentration from about 10 to about 400 g/l.
11. A process as claimed in claim 1, wherein the cell has a temperature from about 40 to about 100 °C.

12. A process as claimed in claim 1, wherein alkali metal hydroxide is transferred to the chlorate reactor.

13. An electrolytic cell for the production of alkali metal chlorate comprising a cation selective separator dividing the cell into an anode compartment in which an anode is arranged and a cathode compartment in which a gas diffusion electrode is arranged, an inlet for electrolyte solution and an outlet for electrolysed solution are provided in the anode compartment, and an inlet for introducing oxygen-containing gas is provided in the cathode compartment, wherein said cell withstands a flow of at least about $0.5 \text{ m}^3 \text{h}^{-1} \text{m}^{-2}$ through the anode compartment.

10 14. An electrolytic cell according to claim 13, wherein said gas diffusion electrode divides the cathode compartment into a gas chamber on one side of the gas diffusion electrode and an alkali metal hydroxide chamber on the other side thereof confined between the gas diffusion electrode and the cation selective separator, an inlet and an outlet for alkali metal hydroxide are provided in the alkali metal hydroxide chamber, and an inlet for introducing oxygen-containing gas is provided in the gas chamber.

15 15. An electrolytic cell according to claim 13, wherein the cation selective separator is a cation exchange membrane.

20 16. An electrolytic cell according to claim 13, wherein a separate outlet for chlorine gas is provided in the anode compartment.

17. An electrolytic cell according to claim 13, wherein an outlet for chlorine gas is not provided in the anode compartment.

18. An electrolytic cell according to claim 13, wherein an outlet for oxygen-containing gas is provided in the cathode compartment.

25 19. A plant comprising an electrolytic cell for the production of alkali metal chlorate comprising a cation selective separator dividing the cell into an anode compartment in which an anode is arranged and a cathode compartment in which a gas diffusion electrode is arranged, wherein an inlet for electrolyte solution and an outlet for electrolysed solution are provided in the anode compartment, and an inlet for introducing oxygen-containing gas is provided in the cathode compartment, wherein the electrolytic cell is connected to a chlorate reactor via an outlet of the anode compartment.

30 20. A plant according to claim 19, wherein the reactor has an outlet for alkali metal chlorate electrolyte connected to a crystalliser.

21. A plant according to claim 19, wherein the alkali metal chlorate reactor is connected to the anode compartment such that a part of the alkali metal chlorate solution can be recirculated to the anode compartment.

22. A plant according to claim 19, comprising storage vessels for alkali metal chloride and/or electrolyte treatment agents.